New Lithographic Techniques for X-Ray Spectroscopy

Completed Technology Project (2015 - 2019)

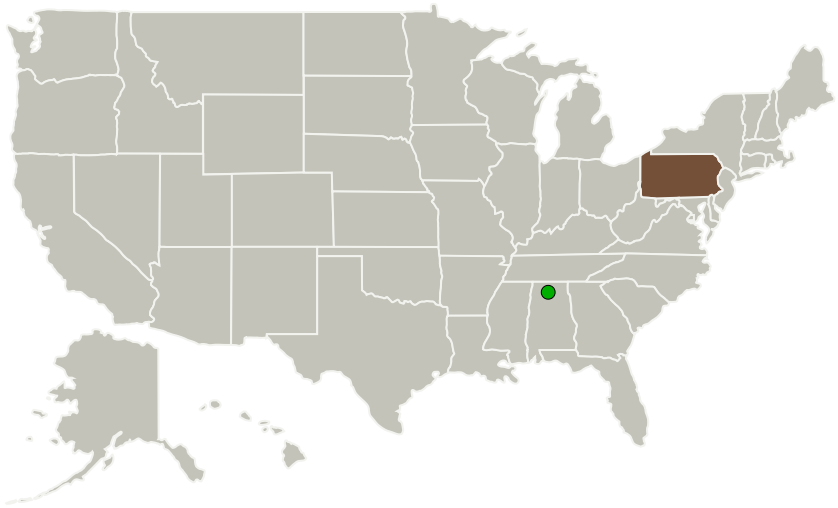
Project Introduction

The goal of my proposed research is to develop a procedure for fabricating high-resolution X-ray diffraction gratings using new techniques in electron-beam lithography. Gratings are the instrument of choice to obtain high-resolution spectra at soft X-ray energies, where a large population of spectral lines exist in astrophysical plasmas. Improving spectral resolution and throughput of spectrometers for next generation X-ray observatories is a direct technological need of NASA as outlined in the Space Technology Roadmap with Technology Breakdown Structure 8.1.3. This fabrication method will produce reflection gratings that push the state of the art for advanced spectrometers by realizing an idealized groove profile.

Anticipated Benefits

This fabrication method will produce reflection gratings that push the state of the art for advanced spectrometers by realizing an idealized groove profile.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Pennsylvania State University-Main Campus(Penn State)	Lead Organization	Academia	University Park, Pennsylvania
Marshall Space Flight Center(MSFC)	Supporting Organization	NASA Center	Huntsville, Alabama

Primary U.S. Work Locations
Pennsylvania

Project Website:

https://www.nasa.gov/strg#.VQb6T0jJzyE

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Pennsylvania State University-Main Campus (Penn State)

Responsible Program:

Space Technology Research Grants

Project Management

Program Director:

Claudia M Meyer

Program Manager:

Hung D Nguyen

Principal Investigator:

Randall Mcentaffer

Co-Investigator:

Jake A Mccoy

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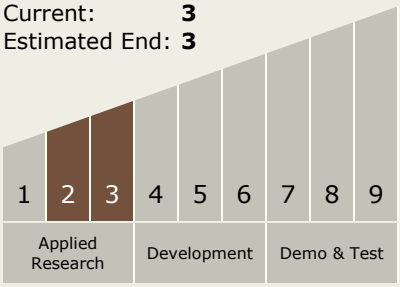
Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.1 Detectors and Focal Planes

Target Destinations

The Sun, Earth, Others Inside the Solar System